PREVALENCE OF WORK-RELATED MUSCULOSKELETAL DISORDERS IN CORPORATE DOCTORS

- A DESCRIPTIVE STUDY

Dissertation submitted to The Tamil Nadu Dr. M.G.R. Medical University
towards partial fulfillment of the requirements of
MASTER OF PHYSIOTHERAPY (Advanced PT in ORTHOPAEDICS)
Degree Programme

KMCH COLLEGE OF PHYSIOTHERAPY

(A Unit of Kovai Medical Center Research and Educational Trust)

Post Box No. 3209, Avanashi Road, Coimbatore – 641 014

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CERTIFICATE

This is to certify that the research work entitled "**Prevalence of work-related musculoskeletal disorders in corporate doctors**" – descriptive study, was carried out by the candidate bearing the **register number 27111101**, KMCH College of Physiotherapy, towards partial fulfillment of the requirements of the **Master of Physiotherapy(Advanced PT in ORTHOPAEDICS)** of the Tamil Nadu Dr. M.G.R. Medical University, Chennai- 32

PROJECT GUIDE

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Project Evaluated on:

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ABSTRACT

Background of the Study: Work related musculoskeletal disorders are an ever growing problem of health professionals. Doctors are affected by WMSD in mass numbers but no adequate assessment of the risk faced by them is researched.

Aim: To assess the musculoskeletal risk factors that affects corporate doctors.

Objectives: 1. To find out the musculoskeletal risk factors of corporate doctors. 2. To find out the prevalence of WMSD in corporate doctors. 3. To find out the relation between age, BMI and WMSD in corporate doctors. 4. To identify the prevalence of WMSD among surgeons and physicians. 5. To identify the prevalence of WMSD among male and female doctors.

Study Design: Descriptive study

Study Method: A musculoskeletal screening questionnaire (CMDQ) is distributed among 100 doctors of KMCH Hospital and they are asked to fill it. The data is tabulated and noted.

Results: Karl Pearson Correlation Coefficient is used in this study to find the correlation between age, BMI and CMDQ scores. The analysis interpreted that both age and BMI showed a moderate correlation with the CMDQ scores. In the 100 doctors surveyed it is calculated that 84 % of them are affected by work-related musculoskeletal disorders. The prevalence rate of WMSD in each anatomical region was Neck: 27.65%, Shoulder: 7.44%, Upper Back: 3.91%, Upper Arm: 1.6%, Lower Back: 24.46%, Forearm: 1.06%, Wrist: 3.19%, Hip/Buttock: 1.06%, Thigh: 3.19%, Knee: 1.06%, Lower Leg: 10.63%, Foot: 15.95%.

Conclusion: Doctors suffer multiple musculoskeletal disorders that significantly affect the work output. As we understand from our study they have exposed to a vast variety of discomforts in their daily life. This study showed a prevalence rate of 84% of WMSD on doctors. The incidence of work related musculoskeletal disorders among doctors was highest in low back, neck, lower legs, foot and shoulders.

Key Words: *WMSD (Work-related Musculoskeletal Disorder), CMDQ (Cornell Musculoskeletal Discomfort Questionnaire)*

1. INTRODUCTION

A muscle, tendon, nerve or joint subjected to stress and trauma on a repeated basis for days, months or years eventually become damaged. This leads to a work related musculoskeletal disorder. WMSD's are also called as Repetitive strain injury or cumulative trauma disorder or overuse injuries.

WMSDs include a wide range of inflammatory and degenerative conditions affecting the muscles, tendons, ligaments, joints, peripheral nerves and blood vessels. These includes conditions like tenosynovitis, epicondylitis, bursitis, nerve compression disorders, sciatica, osteoarthrosis, myalgia, low back pain and other regional pain syndromes commonly involved in low back, neck, shoulder, forearm, hand, hip, knee, ankle and heel.

The greatest challenge of all the nations in the world is to deliver the basic health care needs to improve the quality of life of the people. Population explosion and economic break down makes this a difficult job.

Hospital workers are under pressure to work more efficiently with fewer resources and management skills to fulfill the expectations of the patients. These stressful situations can be worsened by physical strains and discomforts in the work place. This puts the health care workers at high risk that leads to musculoskeletal disorders.

Work in hospital setup has shown to be associated with musculoskeletal complaints. MSD is found to be one of the main reasons for long term sickness absenteeism in health care workers.

Doctor profession is considered as a highly demanding job where there is always shortage of manpower. This scenario pressurizes doctors to work more efficiently with fewer resources and skills. Doctors are involved in very wide range of physical actions in different positions and posture that may not be ideal for them. This could place them at a higher risk of accidents and injuries. These situations are worsened by physical discomfort in the work place and lead them to higher potential risk of physical strains that can lead to WMSD

The WMSD in doctors are related to working positions, inefficient posture, frequent and repetitive movements, extreme joint positions, design and workstation configuration, duration and number of examinations without rest. These factors are combined with other factors like age and physical activity which modulate the risk of development of MSD in the individual.

The job task of a doctor is physically challenging and they are highly prone to develop WMSD's. There are only a few prevalence studies available about the WMSD's among doctors. It needs further research to determine the effects of physical demands on doctors.

1.1. NEED FOR STUDY

Work related musculoskeletal disorders are an ever growing problem of employees and institutions. Hospital workers are one of the largest groups that are affected by WMSD. It is much studied in nursing and other health professionals except doctors. Doctors are affected by WMSD in mass numbers but no adequate assessment of the risk faced by them is researched.

The main propose of this study is to find out the prevalence and risk factors faced by doctors.

1.2 AIM AND OBJECTIVES

1.2.1. AIM

- To assess the musculoskeletal risk factors that affects corporate doctors.

1.2.2. OBJECTIVES

- To find out the musculoskeletal risk factors of corporate doctors.
- To find out the prevalence of WMSD in corporate doctors.
- To find out the relation between age, BMI and WMSD in corporate doctors.
- To identify the prevalence of WMSD among surgeons and physicians.
- To identify the prevalence of WMSD among male and female doctors.

2. REVIEW OF LITERATURE

2.1. Prevalence of WMSD

Karen M Oude Hengek KM et al. 2011, studied on prevalence and incidence of musculoskeletal symptoms a among hospital physicians and found out there is high prevalence of MSD in Physicians.[29]

Szeto GP, Ho P et al. 2009, studied the work related musculoskeletal symptoms in surgeons and found out that there is strong association of physical and psychosocial factors with the musculoskeletal symptoms in surgeons.[50]

Iordache C Scutariu et al. 2010, studied on prevention of spinal disorders in dentistry and found that 71% are affected by spinal disorders.[22]

Wauben Ls et al. 2006, found that lack of ergonomic guidelines and awareness that poses tough positions in operating room.[52]

Liang Ca et al. 2011 studied the Musculoskeletal Disorders and Ergonomics in Dermatologic Surgery and found out that there is high prevalence of musculoskeletal disorder in Dermatological surgery.[34]

Capone AC Parikh PM et al. 2010, estimated the prevalence and functional impact of work-related injury in 339 plastic surgeons and other surgical specialists and found that self-reported injury is more prevalent in surgery and this study underscores the need for a formal, multicenter assessment of occupational injury in surgeons.[13]

Stromberg MW et al. 2010, did a survey on the occurrence of musculoskeletal disorders in the population of 378 gynaecologists and general surgeons performing laparoscopic surgery and found out musculoskeletal disorders in majority of laparoscopist.[49]

Holm SM and Rose KA studied Work-related injuries of 422 doctors of chiropractic in the United States and found out high prevalence of upper extremity injuries was reported in the group surveyed.[20]

Nicola, lilana, Paoletta et al. 1999, Studied work related musculoskeletal complaints in sonologist and found that 80% of the sonologist were currently affected or had been affected in the past with MSD.[39]

Hung-Wen Kao et al. 2009, investigated the association of WMSD and risk factors on the medical staff in a radiology department and found that work posture and movement are the main cause of MSD in radiology department. Time off during the work shifts appeared to lower the discomforts.[21]

Alison, Barbara, Karen, 2003, studied on workplace prevention and musculoskeletal injuries in 1163 nurses and found out that the usage of mechanical devices and lifting team is limited in nursing workplace thus increasing the MSD.[4]

Marc Campo, Sherri et al. 2008, studied the musculoskeletal disorders in physical therapists and found out that the exposure to patient handling and manual therapy increase the risk of WMSD.[37]

Byron, Thomas, John et al. 1996, studied WMSD in physical therapist and advised that there should be specific strategies developed to reduce WMD in PT field.[11]

Mohan Jagannath, et al. 2003, studied on ergonomic risk assessment for hospital workers and found that Hospital workers are highly exposed to MSD that affect the quality of life.[38]

Long MH, Johnstonv, et al. 2011, studied the work related upper quadrant musculoskeletal disorders in midwives, nurses and physicians and found that there is strong association with WMSD and quality of life.[36]

Peled K. 2005, studied Workplace safety assessment and injury prevention in hospital settings and found Work-related injuries are becoming increasingly prevalent in hospital settings. These injuries are impacting all professionals providing services in the health care arena including nurses, physicians, and household cleaning employees.[46]

Walsh l Turner S et al. 2005, surveyed the incidence of work-related illness in the UK health and social work sector and found that there is a high incidence of mental and physical illness in this sector in the year 2002-2003.[51]

2.2. Cornell Musculoskeletal Disorder Questionnaire

Oguzhan erdin , Kubilay Hot et al. 2010, studied the cross-cultural adaptation, validity and reliability of Cornell Musculoskeletal questionnaire and found out that CMDQ have good psychometric with reliability and validity to asses musculoskeletal discomfort in Turkish population. It can be used effectively as a valuable data collection tool.[42]

Afifehzadeh H, Choobineh A et al. 2011, checked the validity and reliability of CMDQ and found that the CMDQ is an appropriate tool for investigation of the level of musculoskeletal disorders in Iranian workers and can be used as a part of ergonomic research and health surveillance programs to prevent the musculoskeletal disorders.[3]

Jasobanta Sethi , Jaspal Sing Sandhu et al. 2011,Studied the effect of BMI on work stress of computer workers and they used CMDQ as a assessment tool. They quoted that CMDQ can be used as a good assessment tool.[24]

Olanre Okunribido et al. 2011, studied the effect of Aging and work related musculoskeletal disorders and found that older age people are more prone to work related musculoskeletal disorders.[43]

3. MATERIALS AND METHODOLOGY

3.1. STUDY DESIGN

- Descriptive study

3.2. STUDY POPULATION

- Doctors in KMCH

3.2.1. Inclusion Criteria

- Age between 25-80
- Both Genders
- Doctors in KMCH

3.2.2. Exclusion Criteria

- Severe Musculoskeletal Conditions
- Disability

3.3. SAMPLE SIZE

- 100 Doctors

3.4. SAMPLING TECHNIQUE

- Purposive Sampling

3.5. STUDY SETTING

- Kovai Medical Center And Hospital, Coimbatore

3.6. NULL HYPOTHESIS

- H_{O1}: There is no significant relationship between Age and Work related Musculoskeletal Disorders.
- H_{O2}: There is no significant relationship between Body Mass Index and Work related Musculoskeletal Disorders.
- H_{O3}: There is no significant variation between work-related musculoskeletal disorders among surgeons and physicians.
- H_{O4}: There is no significant variation between work-related musculoskeletal disorders among male and female doctors.

3.7. STUDY METHOD

- A musculoskeletal screening questionnaire (CMDQ) was distributed among the doctors of KMCH Hospital and they were asked to fill it.
- The data were tabulated and noted.

3.8. OUTCOME MEASURE

- Cornell Musculoskeletal Discomfort Questionnaire.

3.9. STATISTICAL ANALYSIS

Karl Pearson Correlation Coefficient is used in this study to find the correlation between Age, BMI and CMDQ scores.

$$r = \frac{\Sigma (x - \bar{x})(y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}}$$

r = the (product moment) correlation coefficient.

X = difference between the deviations of X series and the mean of X.

Σx^2 = square of the standard deviations of X

y = difference of deviations of Y series from the mean of Y.

Σy^2 = square of the standard deviations of Y.

The value of the coefficient of correlation as obtained by the above formula shall always lie between +1 and -1. When r = +1, it means there is perfect positive correlation between the variables. When r = -1, it means there is perfect negative correlation between the variables.

Scatter plot were drawn to examine these relationship further for each statistical test.

4. DATA PRESENTATION

4.1. TABULAR PRESENTATION

4.1.1. Percentage of Doctors Affected by WMSD

Number of Doctors Surveyed	Number of Doctors with WMSD	Percentage of Doctors affected by WMSD
100	84	84%

4.1.2. Percentage of Surgeons Affected by WMSD

Number of Doctors Surveyed	Number of Doctors with WMSD	Percentage of Doctors affected by WMSD
32	30	93.75%

4.1.3. Percentage of Physicians Affected by WMSD

Number of Doctors Surveyed	Number of Doctors with WMSD	Percentage of Doctors affected by WMSD
68	54	79.41%

4.1.4. Percentage of Male Doctors Affected by WMSD

Number of Doctors Surveyed	Number of Doctors with WMSD	Percentage of Doctors affected by WMSD
91	76	83.51%

4.1.5. Percentage of Females Doctors Affected by WMSD

Number of Doctors Surveyed	Number of Doctors with WMSD	Percentage of Doctors affected by WMSD
9	8	88.88%

4.1.6. Anatomical Areas affected in WMSD

Anatomical Area	Percentage Affected
Neck	23.03 %
Shoulder	5.88 %
Upper Back	4.90 %
Upper Arm	0.98 %
Lower Back	25 %
Forearm	0.98 %
Wrist	2.94 %
Hip/Buttocks	1.47 %
Thigh	2.45 %
Knee	5.39 %
Lower Leg	14.7 %
Foot	12.25 %

4.1.7. Anatomical Areas affected in WMSD among Surgeons

Anatomical Area	Percentage Affected
Neck	27.65 %
Shoulder	7.44 %
Upper Back	3.19 %
Upper Arm	1.06 %
Lower Back	24.46 %
Forearm	1.06 %
Wrist	3.19 %
Hip/Buttocks	1.06 %
Thigh	3.19 %
Knee	1.06 %
Lower Leg	10.63 %
Foot	15.95 %

4.1.8. Anatomical Areas affected by WMSD among Physicians

Anatomical Area	Percentage Affected
Neck	19.09 %
Shoulder	4.54 %
Upper Back	6.36 %
Upper Arm	0.90 %
Lower Back	25.45 %
Forearm	0.90 %
Wrist	2.72 %
Hip/Buttocks	1.81 %
Thigh	1.81 %
Knee	9.09 %
Lower Leg	18.18 %
Foot	9.09 %

4.1.9. Anatomical Areas affected by WMSD among Male Doctors

Anatomical Area	Percentage Affected
Neck	23.91 %
Shoulder	5.97 %
Upper Back	5.43 %
Upper Arm	1.08 %
Lower Back	25 %
Forearm	1.08 %
Wrist	2.71 %
Hip/Buttocks	1.63 %
Thigh	2.71 %
Knee	4.89 %
Lower Leg	15.76 %
Foot	10.32 %

4.1.10. Anatomical Areas affected by WMSD among Female Doctors

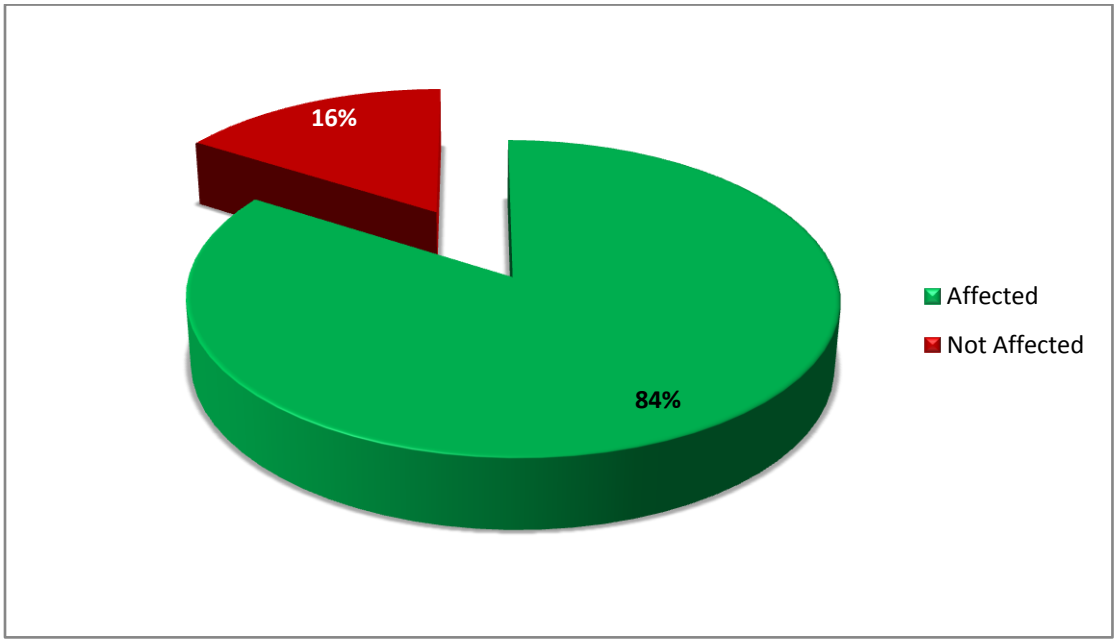
Anatomical Area	Percentage Affected
Neck	15 %
Shoulder	5 %
Upper Back	0 %
Upper Arm	0 %
Lower Back	25 %
Forearm	0 %
Wrist	5 %
Hip/Buttocks	0 %
Thigh	5 %
Knee	10 %
Lower Leg	5 %
Foot	30 %

4.1.11. Co-relation between Age, BMI and CMDQ Score

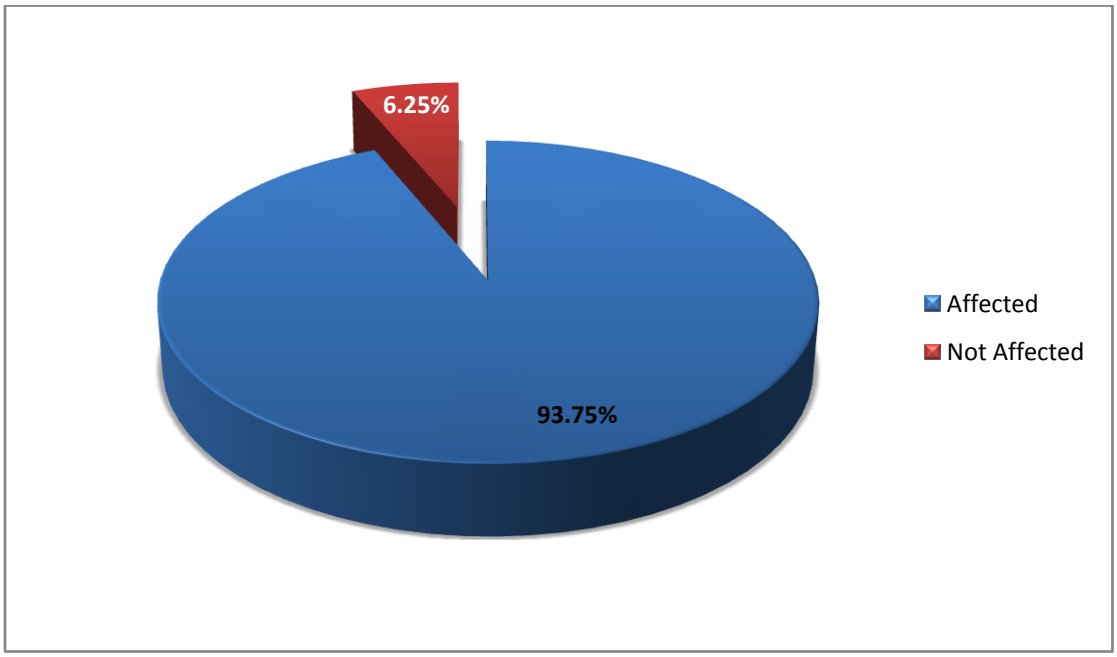
	AGE	BMI
CMDQ SCORE	r = 0.3270	r = 0.1681

4.2. GRAPHICAL REPRESENTATION

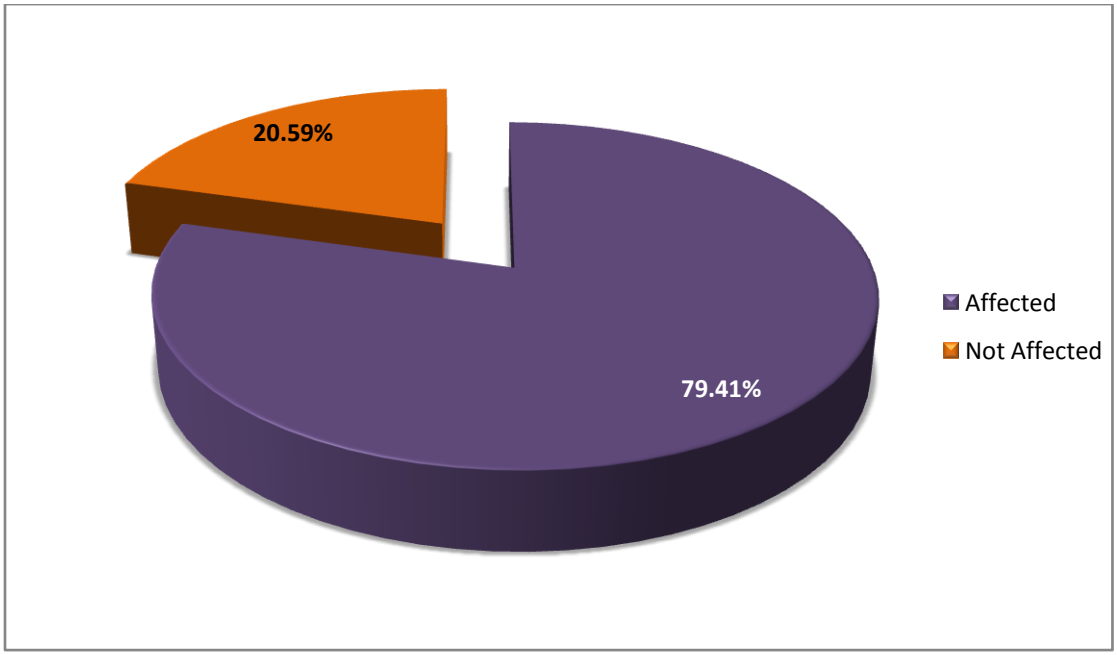
4.2.1. Percentage of Doctors Affected by WMSD



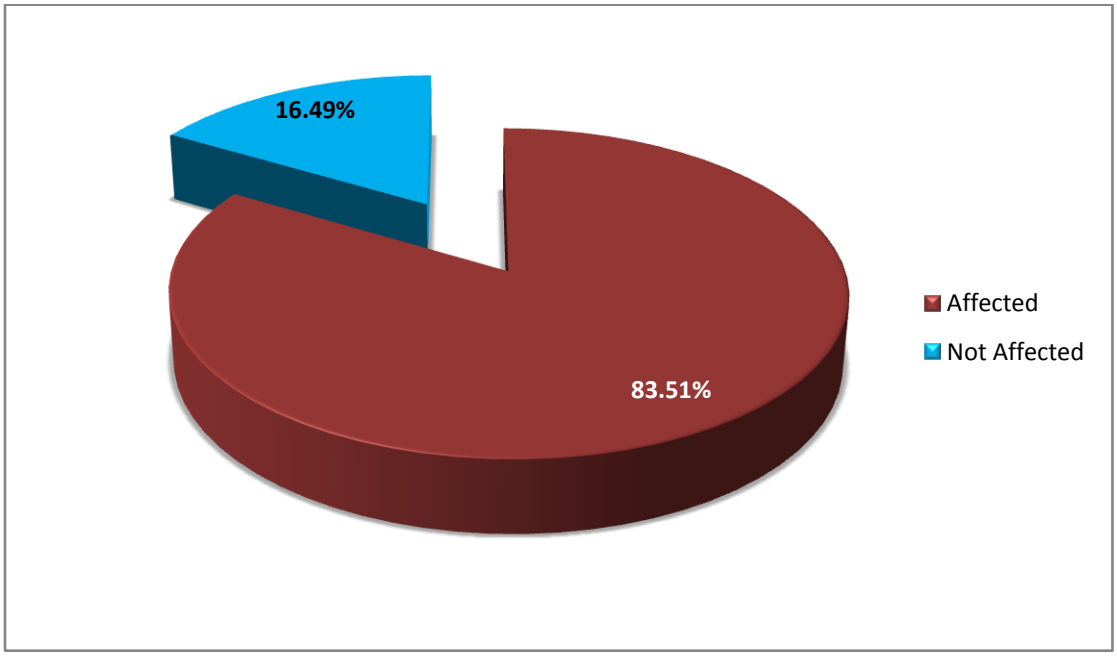
4.2.2. Percentage of Surgeons Affected by WMSD



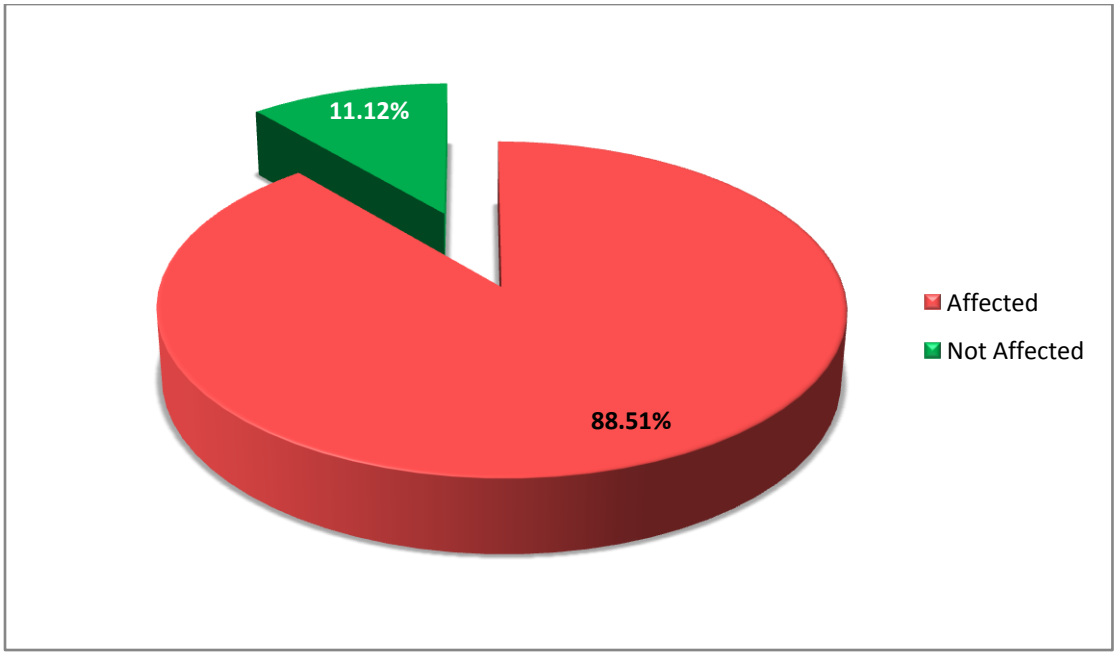
4.2.3. Percentage of Physicians Affected by WMSD



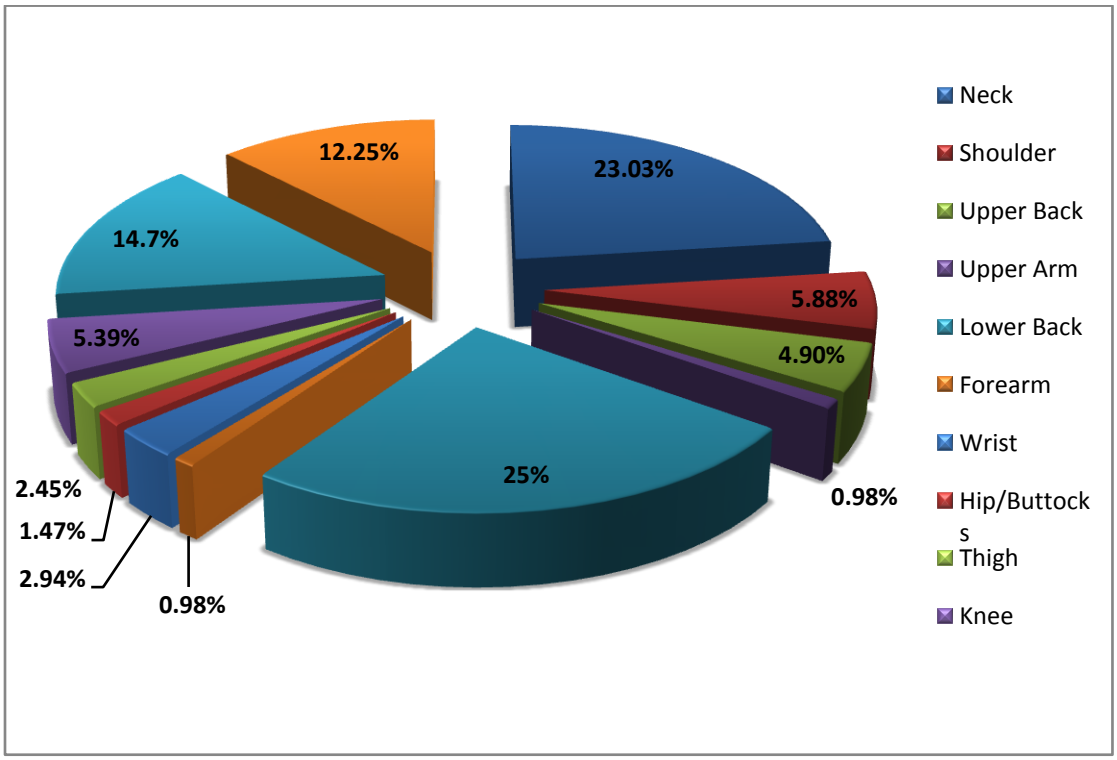
4.2.4. Percentage of Male Doctors Affected by WMSD



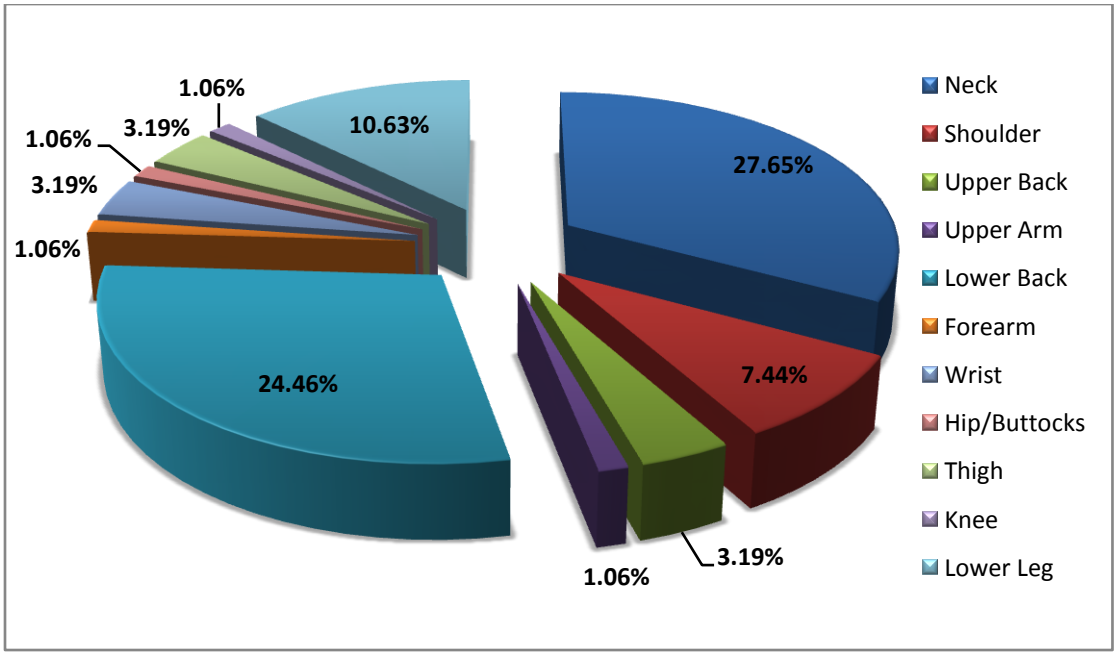
4.2.5. Percentage of Female Doctors Affected by WMSD



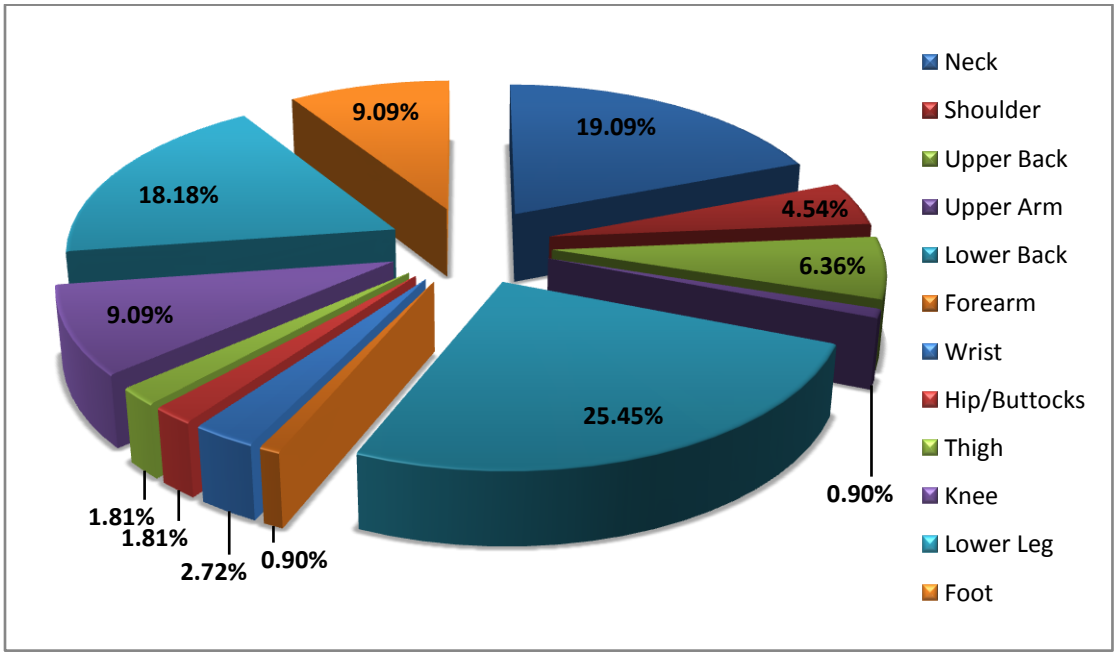
4.2.6. Anatomical Areas affected in WMSD among Doctors



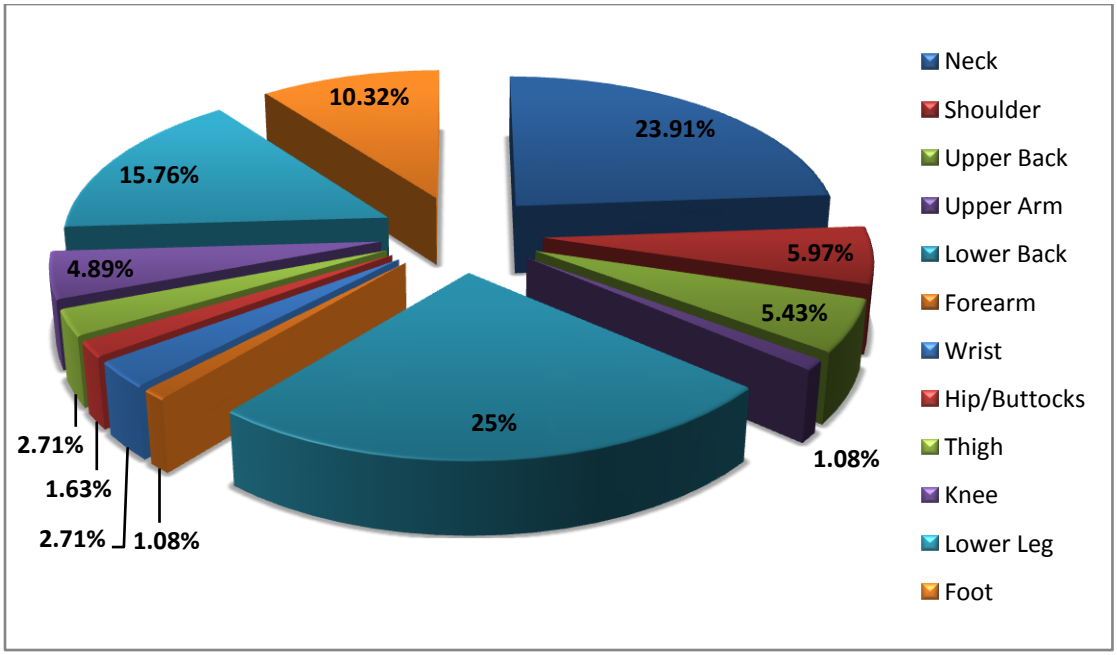
4.2.7. Anatomical Areas affected in WMSD among Surgeons



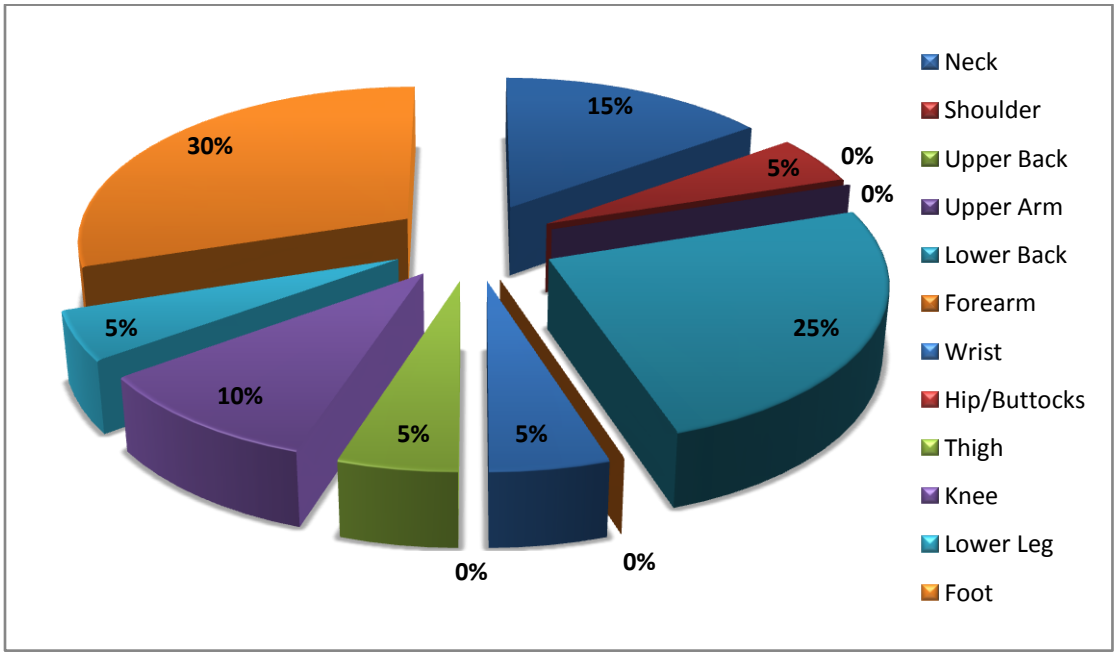
4.2.8. Anatomical Areas affected in WMSD among Physicians



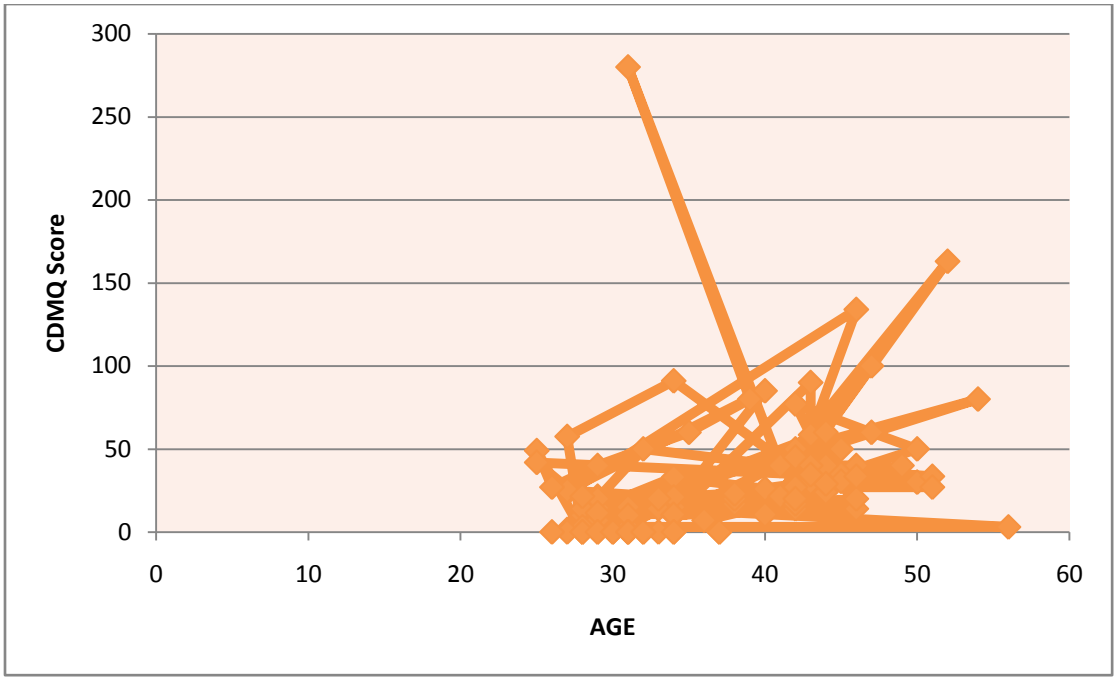
4.2.9. Anatomical Areas affected in WMSD among Male Doctors



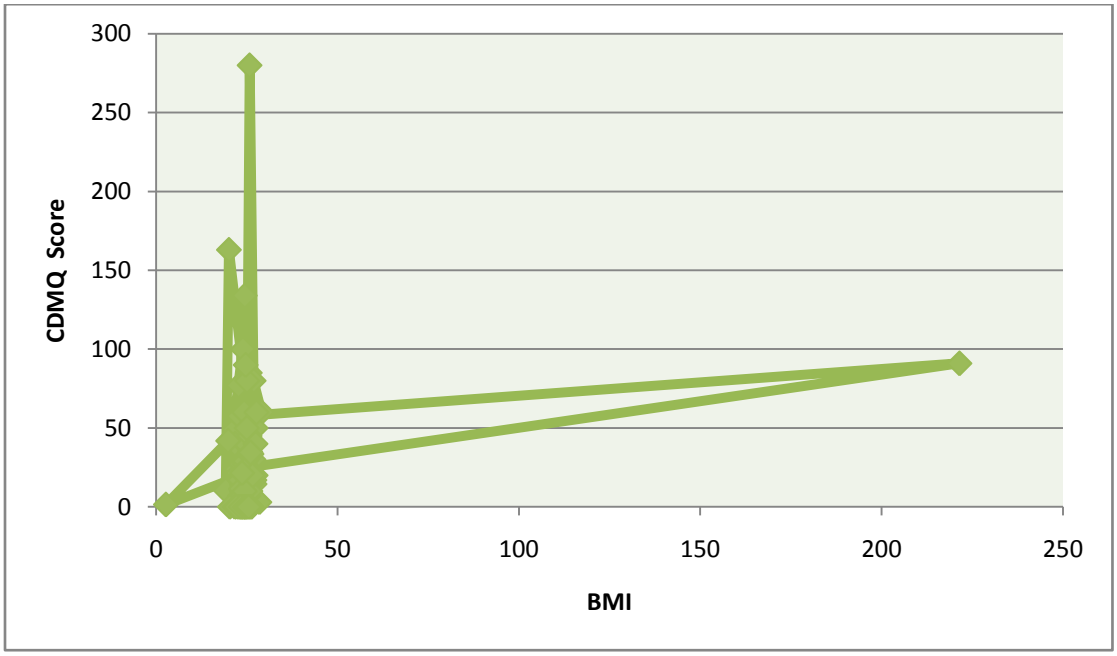
4.2.10. Anatomical Areas affected in WMSD among Female Doctors



4.2.11. Age and CDMQ



4.2.12. CDMQ and BMI



5. DATA ANALYSIS AND INTERPRETATION

Prevalence Analysis

Among the 100 doctors surveyed 84 were found to be affected by work related musculoskeletal disease. It's calculated that 84 % of them were affected by work-related musculoskeletal disorders.

The prevalence of work related musculoskeletal disorders is tabulated by counting the number of subjects affected by work related musculoskeletal disorders in relation to anatomical regions. The prevalence rate of WMSD in each anatomical region was Neck: 23.3%, Shoulder: 5.88%, Upper Back: 4.90%, Upper Arm: 0.98%, Lower Back: 25%, Forearm: 0.98%, Wrist: 2.94%, Hip/Buttock: 1.47%, Thigh: 2.45%, Knee: 5.39%, Lower leg: 14.7%, Foot: 12.45%.

- **Surgeons**

Among the 32 surgeons surveyed 30 were found to be affected by work related musculoskeletal disease. It's calculated that 93.75% of them were affected by work-related musculoskeletal disorders.

The prevalence rate of WMSD in each anatomical region was Neck: 27.65%, Shoulder: 7.44%, Upper Back: 3.91%, Upper Arm: 1.6%, Lower Back: 24.46%, Forearm: 1.06%, Wrist: 3.19%, Hip/Buttock: 1.06%, Thigh: 3.19%, Knee: 1.06%, Lower Leg: 10.63%, Foot: 15.95%.

- **Physicians**

Among the 68 physicians surveyed 54 were found to be affected by work related musculoskeletal disease. It's calculated that 79.41% of them were affected by work-related musculoskeletal disorders.

The prevalence rate of WMSD in each anatomical region was Neck: 19.09%, Shoulder: 4.54%, Upper Back: 6.36%, Upper Arm: 0.90%, Lower Back: 25.45%, Forearm: 0.90%, Wrist: 2.72%, Hip/Buttock: 1.81%, Thigh: 1.81%, Knee: 9.09%, Lower Leg: 18.18%, Foot: 9.09%.

- **Male Doctors**

Among the 91 male doctors surveyed 76 were found to be affected by work related musculoskeletal disease. It's calculated that 83.51% of them were affected by work-related musculoskeletal disorders.

The prevalence rate of WMSD in each anatomical region was Neck: 23.91%, Shoulder: 5.97%, Upper Back: 5.43%, Upper Arm: 1.08%, Lower Back: 25%, Forearm: 1.08%, Wrist: 2.71%, Hip/Buttock: 1.63%, Thigh: 2.17%, Knee: 4.89%, Lower Leg: 15.76%, Foot: 10.32%.

- **Female Doctors**

Among the 9 female doctors surveyed 8 were found to be affected by work related musculoskeletal disease. It's calculated that 88.88% of them were affected by work-related musculoskeletal disorders.

The prevalence rate of WMSD in each anatomical region was Neck: 15%, Shoulder: 5%, Upper Back: 0%, Upper Arm: 0 %, Lower Back: 25%, Forearm: 0 %, Wrist: 5%, Hip/Buttock: 0%, Thigh: 5%, Knee: 10%, Lower Leg: 5%, Foot: 30%.

Correlation Analysis

The correlation between Age and CMDQ was calculated as r = 0.3270. Though it is a positive value it shows moderate correlation between Age and CMDQ scores.

The correlation between BMI and CMDQ was calculated as r = 0.1681.Though it is a positive value it shows poor correlation between BMI and CMDQ scores.

6. DISCUSSION

Work related musculoskeletal disorders, are defined as musculoskeletal disorders that results from a work related event. Work related musculoskeletal disorders are one of the most common problems faced by the healthcare workers. It is reported that it significantly affects the quality of life by interfering in the work capacity of the individual. WMSD is an important cause for development of work incapacity and sickness absenteeism which leads to socio-economic burden on the individual.

As we all know Doctor Profession is very demanding and considered to be exposed to wide range of physical discomforts and disorders due to multiple physical exposures to various kinds of environments. Prolonged work timings, inappropriate working positions, inefficient postures, repetitive movements, extreme joint positions and lack of rest periods put them on a higher potential risk of work related musculoskeletal disorders.

The main purpose of the study is to find out the prevalence of risk factors faced by doctors. In this study 100 doctors in KMCH hospital were surveyed using Cornell Musculoskeletal discomfort questionnaire and the data was tabulated.

Prevalence data were taken from the questionnaire and tabulated. The relation between age, and BMI was calculated using Karl Pearsons correlation coefficient.

Out of 100 doctors assessed 91 were males and 9 females. In 100 doctors 84 were affected by work related musculoskeletal disorders giving an incidence of 84%. This data is higher than the data provided by Derek R Smith et al which is 67.5% and Grace PY Szeto et al provided 82.9%. 62% of those who are injured had an injury to more than one body area. This higher prevalence seen in our study may be due to the condition in which doctors practice in India.

In our study low back pain is reported to be the most common work related disorder faced by doctors with a incidence rate of 25%. Cunningham et al reported the rate of low back pain is 67%. Smith et al and Szeto et al also supported this by reporting 44% and 68% of prevalence in Low back pain in physicians and surgeons. Most often the

doctors need to adopt slouched posture, and these types of unconventional postures can irritate the soft tissues like muscles, tendons, ligaments and spinal discs. Significant decline in general health causes fatigue and discomfort and exposes the person to higher risk of developing back pain.

Neck pain is the next commonly reported musculoskeletal disorder. Our study shows an incidence rate of Neck: 23.3%. This is also supported by other studies reporting 42-83% of annual prevalence of neck pain (Karen et al). Muscular imbalance, repetitive nature of task, continuous working sessions without a break and relaxation and improper postures are the predisposing factors for neck pain. Lack of ergonomically modified workplaces is also a major concern.

Lower leg: 14.7% and foot: 12.45% are the other most commonly noted work-related musculoskeletal disorders among doctors. This might be due to the prolonged standing time and walking which is very common with Indian doctors. Pooling of blood in the lower leg and feet as a result of contact stress and prolonged sitting in the same position is also a cause for the higher rate of lower leg and foot pain.

The other parts affected by work related musculoskeletal disorders are shoulder: 5.88%, knee: 5.39%, upper back: 4.90%, thigh: 2.45%, wrist: 2.94%, hip/buttock: 1.47%, upper arm: 0.98% and forearm: 0.98%, Wolf et al and Johnston et al supported this data with their 33% of incidence in arm and 4-11% in wrist and elbow. Smith and Szeto reported a 17% of incidence on shoulders.

Out of 32 surgeons assessed 30 were affected by work related musculoskeletal disorders giving an incidence of 93.75%. Neck, lower back, foot, shoulder and upper back were mostly affected in surgeons. These results confirm that upper body is more affected in surgeons. Szeto GP,Ho P et al supported this result in their study on surgeons and reported that Neck, Lower back, and shoulder were mostly affected by work related musculoskeletal disorders. Their works are often time consuming and requires long time standing in slouch position, repetitive movements, intense concentration, précised movements and sophisticated techniques makes surgeons more vulnerable to musculoskeletal disorders.

Ergonomic modifications in operation theatres and behavior modification are recommended to prevent work-related musculoskeletal disorders in surgeons.

Out of 68 physicians assessed 54 were affected by work related musculoskeletal disorders giving an incidence of 79.41%. The results show that lower back, neck, lower leg and knee are mostly affected in physicians. Karen M et al systematic review also showed a similar result as the current study. The prevalence of musculoskeletal injuries in physicians could be due to the continuous treatment sessions of large number of patients in same position without having sufficient rest periods. Moreover assessing the patients by sitting in uncomfortable postures also contributes significantly to the work-related musculoskeletal disorders in physicians. Inadequate ergonomic awareness and proper guidelines is another concerning factor leading to injuries. Modification of workplace and adopting comfortable postures can help bringing down the rate of musculoskeletal problems.

74 male doctors out of 91 assessed are found out to be suffering from any kind of musculoskeletal disorders revealing an incidence of 83.51%. The results show that neck, lower back, lower leg and foot are the most affected areas in male doctors.

Among 9 female doctors assessed 8 were found to be affected by musculoskeletal problems revealing an incidence of 88.88%. Foot, lower back and neck were the most affected parts in female doctors. One of the most important contributing factors for the foot and lower back pain are due to the use of improper foot wears that fail to provide adequate cushion and support which results in poor posture and balance.

The relation between age and BMI is studied in survey. It showed that there is a moderate correlation between age and WMSD. This shows that age is not an independent risk factor for WMSD. Older workers are prone to WMSD due to decreased functional capacity and age related changes in the body. (Olanre Okunribido et al.). Most of the doctors who were not suffering from any work-related musculoskeletal disorders where in the age group 25 to 35 years which further stress on the correlation between age and work-related musculoskeletal problems.

BMI and WMSD shows a mild correlation and this may be due to overweight causing mechanical loads on tissue. Decreased postural stability and increased intra-diskal pressure puts the individual at a higher risk of causing a work related musculoskeletal disorder. (Josobanta Sethi et al).

Greater effort towards ergonomic awareness, injury prevention and education should be implemented in order to reduce the prevalence of work-related musculoskeletal disorders. Including regular exercises and adequate resting sessions are effective measures to counter the work-related ailments.

7. LIMITATIONS AND SUGGESTIONS

- In this study the sample surveyed was very less so generalization to the whole population of doctors is difficult.
- ✓ A larger population can be taken for a better result.

- Female doctors surveyed was considerably less.
- ✓ In further studies more female doctors can be included for improved results.

- The questionnaire was filled by the respondent so there is a chance of hiding the discomforts faced by them and thus causing a bias.
- ✓ Questionnaires can be filled by the assessor which can also include physical examination.

- The study was conducted for 6 months which is a short period of time to study musculoskeletal disorders thoroughly.
- ✓ A longer duration study can be done for more accurate results

- Doctors in Kovai Medical Center and Hospital were only included.
- ✓ Doctors from other hospitals can also be included in further studies that can help identifying problems faced by them in different environments.

- In this study we didn't assess the ergonomic factors that affect doctors.
- ✓ Ergonomic assessment can also be done to get a clear picture of what is causing the discomforts.

- Education about the proper manual handling and strategies to prevent MSD was not much stressed.
- ✓ Education of proper handling techniques and prevention can also be included in the study.

- Management for WMSD was not administered.

✓ Further studies can be done on management of WMSD in doctors.

8. CONCLUSION

The main aim of the study was to know the prevalence and risk factors that affect the doctors in a corporate hospital.

Doctors suffer multiple musculoskeletal disorders that significantly affect the work output. As we understand from our study that they are exposed to a vast variety of discomforts in their daily life. This study showed a prevalence rate of 84% of WMSD on doctors. Although number of female doctors studied were less they showed higher rate of work-related musculoskeletal disorders than the male doctors. The incidence of work-related musculoskeletal disorders was more seen in surgeons compared to physicians. The incidence of work related musculoskeletal disorders among doctors was highest in low back, neck, lower legs, foot and shoulders. The age and BMI also had a significant effect on WMSD.

REFERENCES

1. Acute shoulder pain: Evidence based management December 2002.
2. *Adegoke BOA,et al;* Work-Related Musculoskeletal Disorders among Nigerian Physiotherapists. BMC Musculoskeletal Disorder 2008 9:112.
3. *Afifehzadeh-Kashani et al :* Validity and reliability of Farsi Version of Cornell Musculoskeletal discomfort questionnaire (CMDQ)Iran Occupational Health .Vol-7,No;4,2011.
4. *Alison M.Trinkoff,Barbar Brady et al ;*Workplace prevention and Musculoskeletal Injuries in Nurses,JONA 2003 Volume 33, Number 3 ,pp153-158.
5. *Arrighi HM et al;* The evolving concept of the health worker survivor effect Epidemiology 1994 5:2 :189-196.
6. *Augusto VG Sampio RE et al;*A look into repetitive strain injury/Work related MSD within physical therapy a clinical Contest.Rev Bras fisioter 2008 12 49-56.
7. Australian Acute Musculoskeletal pain Guidelines Group By National health and research council: Evidence Based Management of acute musculoskeletal pain 2003 June.
8. *Badley EM,Rasooly et al ;* Relative Importance of musculoskeletal disorders as a cause of chronic health problem,disability and health care utilization.Ontario Health Survey.1994 3:505-514.
9. *Bolanle MS Timubu,Chidozie E Mbada et al ;* Work related musculoskeletal disorders among nurses in Ibadan,South-west Nigeria:A cross-Sectional Survey.BMC Musculoskeletal Disorders 2010.
10. *Buddhadev Neeti P et al;* Work-Related Musculoskeletal disorders: A survey of physiotherapists in saurashtra region National journal of Medicine and research 2012-Jun Vol-2 Issue-2 pp-179-181.
11. *Byron E Brok,Thomas M Cook et al;* Work-Related Musculoskeletal disorders Among Physical Therapists.Physical Therapy August 1996,Volume 76,Number 8,pp 827-835.
12. *C.Cunningham et al :* Low back pain and occupation among irish health care workers.

13. *Capone AC,Parikh PM et al ;*Occupational injuries in plastic surgeons.Plast-Reconstr Surg 2010 May pp-1555-61.
14. *Christine B Novak*; Upper extremity Work-Related Musculoskeletal Disorder:A treatment Perspective. Journal of orthopaedics and Sports Physical therapy.Vol-34 No-10 October 2004.
15. Cornell University Ergonomics Web http://ergo.human.cornell.edu.
16. *Evanoff B*: Work-Related Musculoskeletal Disorders examining the research base epidemiology: Physical Factors an assement of the NIOSH Review.Work-Related Musculoskeletal Disorders:Repost,Workshop summary and workshop paper Washington DC-National Acadamy Press 1999,152-154.
17. *Feuerstein, Michael A* multidisciplinary approach to the prevention, evaluation, and management of work disability Elektronische Ressource1991The journal of occupational rehabilitation (1991)
18. *Grace P Y Szeto et al;* Work related musculoskeletal symptoms in surgeons:UNE 2009.Vol-19.Issue-2.pp-175-184.
19. Hales TR et al; Epidemiology of work-Related musculoskeletal disorders.Orthop Clinical North America 1996 Oct 27:4 679-709.
20. *Holm SM,Rose KA et al;* Work related injuries of doctors of chiropractic in the united states.Journal of manipulative and physiological therapy Vol-29,Issue-7,pp-518-523.
21. *Hung-Wen Kao,Dah-Shyong Yu et al ;* Work related Musculoskeletal disorders among medical staff in a radiology department.Journal Of medical Science 2009 Feb-29:3 pp-119-124.
22. *Iordache C,Scutariu M et al ;* Prevention of spinal disorders in dentistry Rev Med Che Soc Med 2010 April-June 1142 pp-571-5.
23. *Isabel L Nunes;* Work-Related Musculoskeletal Disorder assessment and prevention.Ergonomics a systems approach.
24. *Jasobanta Sethi, Jaspal Sing Sandhu et al ;* Effect of Body Mass Index on work related musculoskeletal discomforts and occupation stress of computer workers in a developed ergonomic setup.Sport Medicine and Arthroscopic Regabilitation 2011 Oct 7:3 1:22.
25. *Jean E Cromie,Valma JR et al ;* Work related musculoskeletal disorders and the culture of physical therapy.Physical therapy 2002 May Vol-82,Num-5 pp-459-472.

26. *John A Bright,Richard Allman et al ;* Philadelphia panel evidence based management clinical practice guidelines on selected rehabilitation intervention for low back pain.Physical therapy 2001 81:1641-1674.
27. *John Albright et al;* Philadelphia panel-Evidence based clinical practice guidelines on selected rehabilitation interventions for low back pain.Physical therapy 2001 :81-1641-1674.
28. *Julia Faucett,Mary Garry ;* Test of two training interventions to prevent Work-Related Musculoskeletal Disorder of upper extremityApplied ergonomics 33 2002 pp-337-347.
29. *Karen M Oude Hengel et al;* The prevalence and incidence of musculoskeletal symptoms among hospital physicians:a Systematic review.Int Arch Occupational Environment Health 2011 84:115-119.
30. *Kemmlert K:* Labour inspectorate investigation for the prevention of occupational musculoskeletal injuries.National institute for occupational health Sweden-1994.
31. *Kilbom A;* Prevention of work-Related Musculoskeletal disorders in the work place.Int Journal Ind Ergono 1998 21:1-3.
32. *Laura Punnett,David H W;* Work-Related musculoskeletal disorders:the epidemiological evidence and the debate.Journal of Electromyography and Kinesiology 2004 14-pp-13-23.
33. *Leijon MG,Hensing K et al ;* Gender trends in sick listing with musculoskeletal symptoms in a Swedish country during a period of rapid increase in sickness absence.Scand Journal of soc Med 1998 26;3,204-213.
34. *Liang CA,Levine VJ et al ;* Musculoskeletal disorders and ergonomics in dermatological surgery:A survey of mohs Surgeons in 2010.Dermatol Surg 2011 Dec 30.
35. *Linton SJ,Kamwendo K et al ;* Low back School a critical review Physical Medicine and Rehabilitation 1987,67:1375-1383.
36. *Long MH, Johnston V;* Work-Related Upper quadrant musculoskeletal disorders in midwives, nurses and physicians: A systematic review of risk Factors and Functional Consequences;Appl Ergon 2011 Aug 16.
37. *Marc Campo, Sherri Weiser et al:* Work-Related Musculoskeletal Disorders in physical therapist:A Prospective Cohort study with 1 year follow-up; Physical Therapy May 2008,Volume 88,Number 5,pp 608-619.

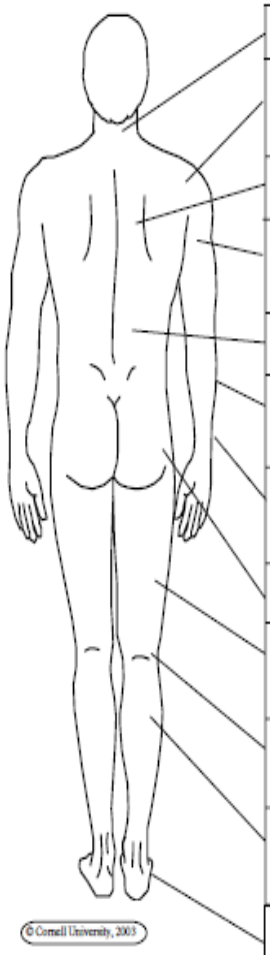
38. *Mohan Jagannath,Kanagasabai Adalarasu;* An ergonomic risk Assesment For Hospital workers.International Journal of Engineering Research and Application,Volume 1 issue 3 pp 864-867.
39. *Nicola Magnavita MD, Liliana Bevilacqua MD et al*; Work-Related Musculoskeletal Complaints in Sonologists,JOEM November 1999, Volume 41, Number 11 pp 981-988.
40. *Nikolai Bogduk;* Evidence Based clinical Guidelines for the Management of Acute Low Back Pain:National Musculoskeletal Initiative.NH and MRC Nov 1999.
41. *Norma Posser, Mary Webb ;* Primary and Secondary prevention of chronic Musculoskeletal Pain 11 June 2010.
42. *Oguzhan Erdinc et al;* Cross Cultural Adaptation and Validity and reliability of CMDQ in Turkish language.2008.
43. *Olanre Okunribido et al ;* Aging and work related musculoskeletal disorders. Health and Safety Laboratory 2010.
44. *Oude Hengel KM,Visser B et al ;* The prevalence and incidence of musculoskeletal symptoms among hospital physicians:A systematic review.International journal of Architecture,occupation and environment health,2011 Feb 2
45. *Pascale Crayon,Michael j Smith et al ;* Work organization,Job Stress and work related Musculoskeletal disorders.Journal of the human Factors and Ergonomic Society 1999;41-644-663.
46. *Peled K.Work. 2005;* 25(3):273-7. Workplace safety assessment and injury prevention in hospital settings.
47. *Raufu A;* Nigerian health authorities worry over exodus of doctors and nurses BMJ 2002 352:65.
48. *Riikimaki H;* Hands up or back to work future challenges in epidemiological research on musculoskeletal disease.Scand J Work Environment Health 1995,21:401-403.
49. *Stromberg MW,Tronstad SE et al ;* Work-Related musculoskeletal disorders when performing laproscopic surgery.Surg Lapro 2010 Feb pp-49-53.
50. *Szeto GP, Ho P,* Ting AC, Poon JT, Cheng SW, Tsang RC: Work-related musculoskeletal symptoms in surgeons. J Occup Rehabil. 2009 Jun;19(2):175-84.

51. *Walsh L,Turner S et al :* The incidence of work related illness in the UK health and social work sector:The health and Occupation Reporting network 2002-2003.Occup Med 2005 Jun,pp-262-7.
52. *Wauben, L · Van Veelen, M · Gossot, D · Goossens, R:* Application of ergonomic guidelines during minimally invasive surgery: a questionnaire survey of 284 surgeons, Surgical Endoscopy, 20(8), 1268-1274, 2006
53. World Health Organization.Early detection of health impairment in occupational exposure to health hazards. International Journal of epidemiology 1975 4:4-343
54. *Yang XW,WangZM et al ;* Compare the occupational stress and work ability among the Doctors,Teachers and Police-Officers.Sichuan Da Xue Xue Bao Yi Xue Ban 2004;34:35:251-4.
55. *Zinta Podniece et al:* Europian Agence for safety and health at work WMSD Back to work Report.2007.
56. *Zinta.Podniece:* Work-Realted Musculoskeletal Disorders:Back to work report 3rd ed European agency for safety and health at work.2007;1:5-7.

APPENDIX – I

CORNELL MUSCULOSKELETAL DISCOMFORT QUESTIONNAIRE (CMDQ) - MALES

The diagram below shows the approximate position of the body parts referred to in the questionnaire. Please answer by marking the appropriate box.



		During the last work week how often did you experience ache, pain, discomfort in:					If you experienced ache, pain, discomfort, how uncomfortable was this?			If you experienced ache, pain, discomfort, did this interfere with your ability to work?		
		Never	1-2 times last week	3-4 times last week	Once every day	Several times every day	Slightly uncomfortable	Moderately uncomfortable	Very uncomfortable	Not at all	Slightly interfered	Substantially interfered
Neck		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Shoulder	(Right)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	(Left)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Upper Back		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Upper Arm	(Right)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	(Left)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Lower Back		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Forearm	(Right)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	(Left)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Wrist	(Right)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	(Left)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hip/Buttocks		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Thigh	(Right)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	(Left)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Knee	(Right)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	(Left)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Lower Leg	(Right)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	(Left)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Foot	(Right)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	(Left)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

APPENDIX - II

CORNELL MUSCULOSKELETAL DISCOMFORT QUESTIONNAIRE (CMDQ) – FEMALES

The diagram below shows the approximate position of the body parts referred to in the questionnaire. Please answer by marking the appropriate box.

		During the last work week how often did you experience ache, pain, discomfort in:					If you experienced ache, pain, discomfort, how uncomfortable was this?			If you experienced ache, pain, discomfort, did this interfere with your ability to work?		
		Never	1-2 times last week	3-4 times last week	Once every day	Several times every day	Slightly uncomfortable	Moderately uncomfortable	Very uncomfortable	Not at all	Slightly interfered	Substantially interfered
Neck		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Shoulder	(Right)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	(Left)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Upper Back		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Upper Arm	(Right)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	(Left)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Lower Back		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Forearm	(Right)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	(Left)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Wrist	(Right)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	(Left)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hip/Buttocks		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Thigh	(Right)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	(Left)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Knee	(Right)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	(Left)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Lower Leg	(Right)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	(Left)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Foot	(Right)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	(Left)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐